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## PIPE CASTING AT PONT-A-MOUSSON<sup>1</sup>

BY GEORGE C. WHIPPLE<sup>2</sup>

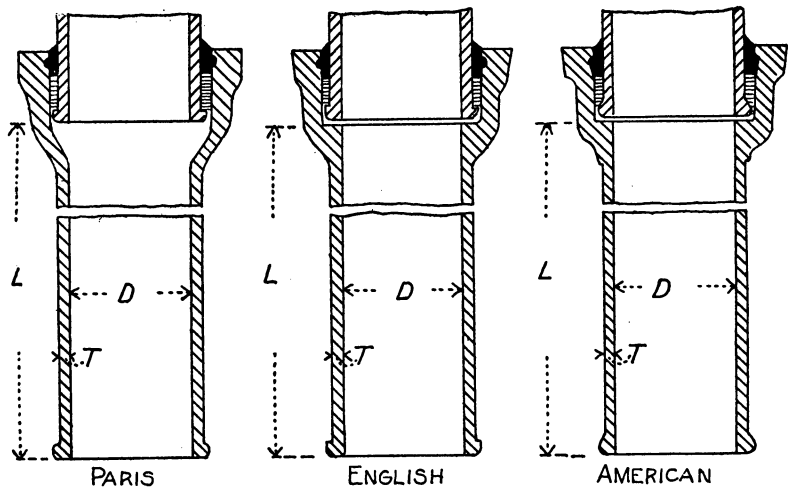
In April, 1920, during a visit to M. Ed. Imbeaux, Ingenieur de Ponts et Chaussées at Nancy, France, the speaker had the pleasure of visiting the pipe foundry of the Société Anonyme des Hauts-Fourneaux et Fonderies at Pont-a-Mousson, France. As this is one of the two most important pipe foundries in France and as it went through an interesting experience during the war, perhaps a few notes in regard to the visit may be worth placing on record.

Pont-a-Mousson is a small town north of Nancy on the Moselle River. It is in the region of the iron mines. The foundry was established in 1856. In 1879 the works covered 435 acres and employed over 1500 men. Just before the war the plant covered 4200 acres and had 6000 employees. It included five blast furnaces, twelve cupolas for melting the iron, foundry buildings which covered ten acres, two large shops, a power station and the dock on the river nearly half a mile long. In 1914 it had a capacity of 300,000 tons of castings a year, of which 150,000 tons represented cast iron pipe. The company also manufactured slag brick and cement. Its iron mines had an annual capacity of over a million tones of ore. The company also operates another large foundry at Foug, near Toul.

Most of the cast iron pipe manufactured is known as "universal" or "City of Paris" pattern, but pipes of English, Swedish, and German patterns are also made. All pipes are coated with coal tar or Angus Smith coating and are tested under a pressure of 500 to 800 feet of water as required before coating. The French pipe differs somewhat from the American pipe. In general it is thinner and has heavier bells. The listed weights for light and heavy pipe correspond approximately to Classes A and B of the American Water Works specifications. All pipes have uniform outside diameters so that the thicker pipes have slightly less capacity than the

<sup>1</sup> Revised from an informal talk before the New York Section on November 17, 1920. Discussion is invited and should be sent to the Editor.

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Standard dimensions of cast iron pipe (American, English, French)

CITY OF PARIS			ENGLISH					AMERICAN (A. W. W. A.)			
D	L	Weight	D	L	Class	T	Weights	D	Class	T	Weight
ins.	ft. ins.	lbs./ft.	ins.	ft. ins.		ins.	lbs./ft.	ins.	(L=12')	ins.	lbs./ft.
3.94	9 10	17	4	9 10	L	0.36	17	4	A	0.42	20
			4		H	0.38	18	4	B	0.45	22
5.91		27	6		L	0.39	27	6	A	0.44	31
			6		H	0.50	36	6	B	0.48	33
11.81	13 1½	65	12	13 1½	L	0.51	65	12	A	0.54	73
			12		H	0.69	93	12	B	0.62	82
17.72		114	18		L	0.61	114	18	A	0.64	129
			18		H	0.75	156	18	B	0.75	150
23.62		168	24		L	0.69	178	24	A	0.76	204
			24		H	0.88	240	24	B	0.89	233
29.53		245	30		L	0.81	262	30	A	0.88	292
			30		H	1.00	342	30	B	1.03	333
35.42		314	36		L	0.91	352	36	A	0.99	392
			36		H	1.19	482	36	B	1.15	454
43.31		453	42		L	1.00	463	42	A	1.10	513
			42		H	1.25	559	42	B	1.28	592
49.22		575	48		L	1.11	581	48	A	1.26	667
			48		H	1.38	739	48	B	1.42	750

Note: Values for French and English Pipe from Catalogue of the Pont-A-Mousson Blast-Furnaces and Iron Foundries Co.

thinner ones. The accompanying diagram and table illustrate this pipe.

The company also manufactures a cast iron pipe surrounded by steel hoops for high pressures. It also manufactures gas pipe and soil pipe. Besides its European trade the company does a large export business. The speaker learned in Switzerland, however, that Pont-a-Mousson pipe was not much in use there, as it was possible to obtain at other places a metal which contains less sulphur and phosphorus and is, therefore, less brittle.

Pont-a-Mousson is said to have been the first French city to be bombarded by the Germans. On July 31, 1914, the works were shut down on account of mobilization. Bombardment began on August 11, and from September 5 to 11 the place was occupied by the enemy. After the Germans had been driven out, however, bombardments continued throughout the war until the armistice. During this time, 5000 bombs and shells fell on the works. Later, the buildings were badly damaged. Many of them were utterly destroyed. Extensive defensive measures had been made, however, sand bags being piled around the machinery, and in many cases these served the purpose of preventing the machinery from being destroyed. In 1915 the company attempted to resume work. This being unsuccessful, however, the company transferred its activities to its branch plant at Foug, and although this plant was only twelve miles from the front and was continually subject to air raids, work was continued for 52 months and during this time, 5,000,000 shells, weighing in the aggregate over 200,000 tons, were manufactured.

After the war operations were resumed as rapidly as possible. Mining was begun November 11, 1918; one cupola was put in operation in April, 1919; pipe casting began in August; and one of the blast furnaces was started in the following November. At the time of our visit repairs were still in progress.

We had an interesting interview with the president of the company, M. Camille Cavallier. He is a very efficient administrative officer and a man of broad education, interested not only in his foundry work but in the welfare of his operatives and in all of the great social and economic questions of the day. He had much to say in regard to the labor situation and believes that France cannot prosper unless the laborers are willing to work nine or ten hours a day instead of eight hours, which they desire. The following quotation from an address which he made before the Association Gen-

erale des Ingenieurs, Architects, et Hygienistes Municipaux, at Naney in 1909, will illustrate the interest which M. Cavallier has in these questions.

We are in a country which for half a century has had an extraordinary industrial development, but it is a curious thing that while health is the most important human possession, man gives more care to his material interests than to his health. When a person is sick, he consults a physician, but no one ever thinks of consulting a hygienist on measures to prevent disease. The profession of "Consulting Doctor of Hygiene" does not exist.

Demographers deplore France's low birth-rate; journalists, generally celibate themselves, denounce the peril; senators preach a crusade of repopulation. Vain efforts! France in all things is economical. Population decrease, moreover, is concomitant with civilization. But while births are few, infant deaths are many. It is a very grave situation for France. Infant mortality figures in other countries show that it is possible to save these lives. The future of France is not in the fathers of families, but depends upon engineers, architects and municipal hygienists. It is these who will increase the population of France by saving lives. An engineer of a city of 25,000, who by his work reduces the death-rate from 20 to 14 per 1000 saves 150 lives a year, and is really increasing the population as much as 3000 fathers of families will do. M. Imbeaux has already done for Nancy as much as 9000 fathers of families, and still looks happy.

The brilliant court of Louis XIV in the 17th century was the admiration of the world, but the sanitary conditions were such that they cannot be described. Louis XIV brought the waters of Marly to Versailles, but it was not for bathing or other sanitary use, but for embellishing the park. One is stupefied, on visiting Versailles, to contrast the wonderful majesty in which the sovereigns held themselves, with the apartments in which they lived, so badly ventilated, so insanitary, so unclean. Times have changed. France has sanitary laws, but as Montesquieu has said, "Laws do not change customs." What the state cannot obtain by law, citizens can themselves do.

The basis of public hygiene and individual hygiene is water,—clean, pure, wholesome, and abundant. In our country we have no lack of water. The reason we don't have better water supplies is because of the powerlessness, the carelessness, the lack of courage of the city electors, the lack of public opinion.